

1   **ABSTRACT**

2           A recessed area formed on a substrate surface is filled with heat sink material to  
3   form a heat sink. The heat sink material has thermal conductivity greater than that of  
4   the substrate. The heat sink may have a substantially flat surface substantially flush  
5   with the substrate surface. The substrate may further include: a planar optical  
6   waveguide formed thereon positioned for optical coupling with an optical device  
7   mounted on the substrate in thermal contact with the heat sink; and/or an electrical  
8   contact layer formed thereon positioned for establishing electrical continuity with an  
9   optical device mounted on the substrate in thermal contact with the heat sink. The  
10   electrical contact may also provide thermal contact between the device and heat sink.  
11   The substrate may further include a low-index optical buffer layer formed on its surface.  
12   Materials for the substrate, buffer layer, and heat sink may include silicon, silica, and  
13   diamond, respectively.

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